Listing of the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently amended) A method of detail enhancement for an original image signal represented by a set of pixels, comprising the steps of:

(a)   detecting image pixels that belong to <u>a luminance transition range of</u> an image edge;

(b)   generating gain suppression factors for the detected pixels <u>in the luminance transition range of the image edge</u>; and

(c)   performing image detail enhancement on the image pixels while selectively reducing enhancement of the detected image pixels <u>in the luminance transition range</u> relative to enhancement of other image pixels based on the gain suppression factors.

2. (Currently amended) The method of claim 1, further comprising the steps of:

selecting enhancement gain factors for the image pixels; and

combining the gain suppression factors with the corresponding enhancement gain factors to obtain adjusted gain factors;

wherein the steps of performing image detail enhancement further includes the steps of performing image detail enhancement on the image pixels based on the adjusted gain factors to selectively reduce enhancement of the detected image pixels <u>in the luminance transition range of the edge</u>.

3. (Currently amended) The method of claim 2, wherein the step of detecting

pixels further includes the steps of:

detecting ~~the center pixel location and the length of the~~ <u>a</u> luminance

transition range of the edge <u>and a center pixel of the luminance transition range</u>.

4. (Currently amended) The method of claim 3, wherein the step of generating a

gain suppression factor for a detected pixel further includes the steps of:

for each pixel within the detected luminance transition range, generating a

gain suppression factor based on: (i) the position of the pixel within the luminance

transition range <u>relative to the center pixel of the luminance transition range</u>, (ii) the

enhancement gain factor for that pixel, and (iii) the luminance contrast across the edge.

5. (Original) The method of claim 3, wherein:

the step of generating the gain suppression factors further includes the

steps of selecting the gain suppression factors such that detail enhancement at the center

pixel location in the luminance transition range is suppressed more than neighboring

pixels in the luminance transition range, wherein for pixel locations farther away from the

center pixel location detail enhancement suppression is further reduced.

6. (Original) The method of claim 5, wherein the gain suppression factors are

selected to essentially eliminate detail enhancement suppression for pixels outside the

detected luminance transition range.

7. (Original) The method of claim 3, wherein the step of generating the gain suppression factors further includes the steps of:

selecting a candidate gain suppression factor α_c for each pixel location within the detected luminance transition range as:

$$\alpha_c = |i| * (1-s) * 2/(N+1) + s$$

where:

N is the length of the luminance transition range,

i is the index for the location of a pixel p_i in the luminance transition range, $-\dfrac{N-1}{2} \le i \le \dfrac{N-1}{2}$, such that the index of the current pixel location is 0, and

s is a variable related to both the local luminance contrast and the pixel's enhancement gain factor, $0 \le s \le 1$.

8. (Original) The method of claim 7, wherein:

$$s = 1 - \max(0, \ \min(1, \ (d - T_1)/(T_2 - T_1)))$$

where:

T_1 and T_2 are predetermined threshold values, $T_2 > T_1 \ge 0$, and

d is the luminance contrast within the detected luminance transition range, as:

$$d = |p_{-\frac{N-1}{2}} - p_{\frac{N-1}{2}}|.$$

9. (Original) The method of claim 8, wherein the threshold values T_1 and T_2 are related to an enhancement gain factor K , as:

$$T_1 = C_1 / K \qquad ,$$

$$T_2 = C_2 / K$$

where C_1 and C_2 are constants.

10. (Original) The method of claim 7, wherein the steps of generating the gain suppression factor for a detected pixel further includes the steps of:

selecting an initial gain suppression factor α ;

upon generating each candidate suppression factor α_c for the pixel location, updating α as:

$$\alpha = \min(\alpha, \alpha_c) .$$

11. (Currently amended) The method of claim 2, wherein the step of performing detail enhancement for the original image signal f at a detected pixel further includes the steps of:

performing a low pass filter function on the image signal f to generate an unsharp image signal f_1 ;

determining the difference between the original image signal f and the unsharp signal f_1 , as a different signal, wherein said difference signal represents image details;

selectively boosting the difference signal such that enhancement of the difference signal at the detected pixel locations is reduced relative to enhancement of other image pixels based on the gain suppression factors; and

adding the boosted signal to the original signal to obtain a detail enhanced image signal *g*.

12. (Original) The method of claim 11, wherein the enhanced image signal *g* is related to the original image signal *f* as:

$$g = (f - f_1) * K * \alpha + f$$

wherein:

$(f - f_1)$ is the difference signal,

K is the enhancement gain factor for the pixel, and

α is the gain suppression factor for the pixel.

13. (Original) The method of claim 1 wherein the step of detecting image pixels that belong to an image edge, further includes the steps of detecting image pixels that belong to a slant image edge.

14. (Currently amended) The method of claim 1, wherein:

the step of detecting image pixels that belong to an image edge further includes the steps of:

defining a two-dimensional window of pixels in the digital image;

determining a ~~variance~~ <u>mean</u> value for a plurality of pixels around a

selected pixel inside said window;

based on the ~~variance~~ <u>mean</u> value, determining if the selected pixel is in an

edge region in the window;

if the selected pixel is in an edge region, then determining if the selected

pixel is essentially a center pixel in a luminance transition range of a slant edge; ~~and~~

if the selected pixel is essentially a center pixel in a luminance transition

range of a slant edge, then determining the length of the luminance transition range of the

slant edge<u>; and</u>

<u>the step of generating gain suppression factors further includes, for each pixel within</u>

<u>the luminance transition range, generating a gain suppression factor based on the position</u>

<u>of the pixel within the luminance transition range relative to the center pixel of the</u>

<u>luminance transition range;</u>

<u>the step of performing image detail enhancement on the image pixels includes</u>

<u>selectively adjusting enhancement of the detected image pixels relative to enhancement</u>

<u>of other image pixels based on the gain suppression factors, such that the length of the</u>

<u>luminance transition range is essentially maintained.</u>

15. (Currently amended) A detail enhancement system for enhancing an original

image signal represented by a set of pixels, comprising:

(a)   a detector that detects image pixels that belong to <u>a luminance transition</u>

<u>range of</u> an image edge;

(b)   a generator that generates gain suppression factors for the detected pixels;

and

(c)   a detail enhancer that performs image detail enhancement on the image

pixels while selectively reducing enhancement of the detected image pixels relative to

enhancement of other image pixels based on the gain suppression factors.

16. (Original) The system of claim 15, wherein the detail enhancer combines the

gain suppression factors with selected enhancement gain factor to obtain adjusted gain

factors, and performs image detail enhancement on the image pixels based on the

adjusted gain factors to selectively reduce enhancement of the detected image pixels.

17. (Currently amended) The system of claim 16, wherein the detector detects ~~the~~

~~center pixel location and the length of the~~ a luminance transition range of the edge and a

center pixel of the luminance transition range.

18. (Currently amended) The system of claim 17, wherein the generator generates

a gain suppression factor for a pixel within the detected luminance transition range based

on: (i) the position of the pixel within the luminance transition range relative to the center

pixel of the luminance transition range, (ii) the enhancement gain factor for that pixel,

and (iii) the luminance contrast across the edge.

19. (Currently amended) The system of claim 17 ~~16~~, wherein the generator selects

the gain suppression factors such that detail enhancement at the center pixel location in

the luminance transition range is suppressed more than neighboring pixels in the

luminance transition range, wherein for pixel locations farther away from the center pixel

location detail enhancement suppression is further reduced.

20. (Original) The system of claim 19, wherein the gain suppression factors are

selected to essentially eliminate detail enhancement suppression for pixels outside the

detected luminance transition range.

21. (Original) The system of claim 17, wherein the generator generates the gain

suppression factors by selecting a candidate gain suppression factor α_c for each pixel

location within the detected luminance transition range as:

$$\alpha_c = |i| * (1-s) * 2/(N+1) + s$$

where:

N is the length of the luminance transition range,

i is the index for the location of a pixel p_i in the luminance

transition range, $-\dfrac{N-1}{2} \le i \le \dfrac{N-1}{2}$, such that the index of the current pixel location is

0, and

s is a variable related to both the local luminance contrast and the

pixel's enhancement gain factor, $0 \le s \le 1$.

22. (Original) The system of claim 21, wherein:

$$s = 1 - \max(0, \ \min(1, \ (d - T_1)/(T_2 - T_1)))$$

where:

T_1 and T_2 are predetermined threshold values, $T_2 > T_1 \geq 0$, and

d is the luminance contrast within the detected luminance

transition range, as:

$$d = | p_{-\frac{N-1}{2}} - p_{\frac{N-1}{2}} |.$$

23. (Original) The system of claim 22, wherein the threshold values T_1 and T_2

are related to an enhancement gain factor K, as:

$$T_1 = C_1 / K \qquad ,$$

$$T_2 = C_2 / K$$

where C_1 and C_2 are constants.

24. (Original) The system of claim 21, wherein the generator generates the gain

suppression factor for a detected pixel by selecting an initial gain suppression factor α,

and upon generating each candidate suppression factor α_c for the pixel location,

updating α as $\alpha = \min(\alpha, \alpha_c)$.

25. (Currently amended) The system of claim 16, wherein the detail enhancer

performs detail enhancement for the original image signal f at a detected pixel, the detail

enhancer comprising:

a filter that performs a low pass filter function on the image signal f to

generate an unsharp image signal f_1;

a difference node that determines the difference between the original

image signal *f* and the unsharp signal f_1, <u>as a difference signal,</u> wherein said difference

represents image details;

a combiner that selectively boosts the difference signal based on the gain

suppression factors such that enhancement of the difference signal at the detected pixel

locations is reduced relative to enhancement of other image pixels; and

a summing node that combines the boosted signal to the original <u>image</u>

signal to obtain a detail enhanced image signal *g*.

26. (Currently amended) The system of claim 25, wherein the enhanced image

signal *g* is related to the original image signal *f* as:

$$g = (f - f_1) * K * \alpha + f$$

wherein:

  <u>*f* is the original image signal,</u>

  $(f - f_1)$ is the difference signal,

  K is the enhancement gain factor for the pixel, and

  α is the gain suppression factor for the pixel.

27. (Currently amended) The system of claim 15, wherein to detect image pixels

that belong to an image edge, the detector defines a two-dimensional window of pixels in

the digital image, determines a ~~variance~~ <u>mean</u> value for a plurality of pixels around a

selected pixel inside said window, based on the ~~variance~~ <u>mean</u> value, determines if the

selected pixel is in a an edge region in the window, if the selected pixel is in an edge

region, then the detector determines if the selected pixel is essentially a center pixel in a luminance transition range of a slant edge, and if the selected pixel is essentially a center pixel in a luminance transition range of a slant edge, then the detector determines the length of the luminance transition range of the slant edge.

28. (New) The system of claim 27 wherein:

the generator is configured to generate gain suppression factor for each pixel within the luminance transition range based on the position of the pixel within the luminance transition range relative to the center pixel of the luminance transition range; and

the detail enhancer is further configured to perform image detail enhancement on the image pixels by selectively adjusting enhancement of the detected image pixels relative to enhancement of other image pixels based on the gain suppression factors, such that the length of the luminance transition range is essentially maintained.